Patent

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In Re Application of:

Jianbo Lu

Serial No. 10/708,668 Group Art Unit: 3611

Filed: 03/18/2004 Examiner: Arce Diaz, Marlon A.

For: CONTROL SYSTEM FOR BRAKE-STEER ASSISTED PARKING AND METHOD THEREFOR

Attorney Docket No. 81095818 FGT1902

CERTIFICATE OF MAILING/TRANSMISSION

I hereby certify that this correspondence is, on the date shown below, being filed electronically through EFS-Web of the United States Patent and Trademark Office.

Signature

Date: 8-4-2006 Donna Kraft

RESPONSE TO NOTICE OF NON-COMPLIANT APPEAL BRIEF
AND CORRECTED APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Sir:

This corrected Appeal Brief is submitted in response to the Notice of Non-Complaint Appeal Brief dated July 12, 2006.

I. Real Party in Interest

The real party in interest in this matter is Ford Global Technologies, LLC, which is a wholly owned subsidiary of Ford Motor Company both in Dearborn, Michigan (hereinafter "Ford").

II. Related Appeals and Interferences

There are no other known appeals or interferences which will directly affect or be directly affected by or have bearing on the Board's decision in the pending appeal.

III. Status of the Claims

Claims 1-32, 34-36, 38-44, 46, 47, 49-51, and 53-60 stand rejected in the Final Office Action. Claims 33, 37, 45, 48, 52, and 61 are objected to as being dependent upon a rejected base claim but would be allowable if rewritten in independent form.

IV. Status of Amendments

There have been no Amendments filed after the final rejection.

V. Summary of Claimed Subject Matter

Generally, as set forth in paragraphs 95-105 and 111-113 of Appellants' specification, and as illustrated in Appellants' Figures 10 and 11, the present inventive method for controlling an automotive vehicle during a turning maneuver includes determining steering angle direction and angular rate and applying brake-steer as a function of driver-selectable signals. In the event that a parking mode is detected positive torques of equal value may be applied to the wheels through the braking system or otherwise, so as to reduce the vehicle's turning radius.

Claim 1 is best understood with reference to paragraphs 96 and 102 of Appellants' specification and steps 208, 209, 210, and 212 of Figure 10. According to Claim 1, a method for *controlling an automotive vehicle having a turning radius includes determining a steering wheel* angle in step 208 of Figure 10, determining a steering wheel direction in step 209 of Figure 10, determining a steering wheel angular rate, at step 210 of Figure 10, and finally, at step 218 of Figure 10 applying brake-steer as a function of steering wheel angle, steering wheel angular rate, and steering wheel direction.

Independent Claim 12 is best understood with reference to Figures 10 and 11, and with respect to paragraphs 98 and 111-113 of Appellants' specification. According to Claim 12, a

method of controlling an automotive vehicle includes detecting a parking mode as found at paragraph 98 and step 214 of Figure 10, and while in the parking mode when a steering wheel angle is increasing, applying brake-steer using a first boost curve, and when the steering wheel angle is decreasing, applying brake-steer using a second boost curve different from the first boost curve. The use of boost curves while in the parking mode and according to steering wheel angle is found in Figure 11 at steps 227 and 229 and in paragraphs 111-113 of Appellants' specification.

Independent Claim 29 is best understood with reference to steps 214 and 222 of Figure 10 and paragraphs 98 and 102 of Appellants' specification. Thus, after a parking mode is detected, with reference to step 214 of Figure 10 and paragraph 98 of Appellants' specification, while in the parking mode, applying a positive torque to a first driven wheel and simultaneously while applying the first positive torque, applying a second positive torque greater than the first positive torque to a second wheel. This reduces the turning radius of the vehicle. The step of applying the positive torques of different value to different wheels is found in Appellants' specification at paragraph 102 and at step 222 of Figure 10.

Independent Claim 38 is best understood with reference to paragraphs 98 and 102 of Appellants' specification and with reference to Figure 10 at steps 214, 218, and 220. Thus, the determination of a drive-selectable mode is found in paragraph 98 and 102 of Appellants' specification and at step 214 of Figure 10. The step of generating a steering enhanced signal in response to a driver-selectable mode is found in paragraph 102 of the specification and with reference to step 218 of Figure 10. Finally, actuating at least one brake on one side of the vehicle in response to steering enhanced signal is found at paragraph 102 of the specification and at step 220 of Figure 10.

Independent Claim 44 is best understood with reference to paragraphs 98 and 102 of Appellants' specification and steps 214, 218, and 220 of Appellants' Figure 10. Thus, after detecting a parking mode, as described in paragraph 98 and at step 214 of Figure 10, a transfer *case mode is detected and brake-steer is applied in response to the parking mode and transfer* case mode, as described in paragraph 102 and as illustrated in steps 218 and 220 of Appellants' Figure 10.

Independent Claim 53 is best understood with reference to paragraphs 98 and 102 of Appellants' specification and with reference to steps 214 and 218 of Appellants' Figure 10. Thus, means for determining parking mode is described in paragraph 98, with controller 26 being described with reference to Figure 3 in paragraphs 51-62 of Appellants' specification. The

use of controller 26 is described in paragraph 102, with reference to step 218 of Figure 10, wherein the process is described of applying a first positive torque to a first driven wheel and applying a second positive torque of greater magnitude to a second wheel. In this regard, Claim 53 is similar to independent Claim 29, which is discussed above.

VI. Grounds of Rejection to be Reviewed on Appeal

The following issues are presented in this appeal:

1. Are Claims 1, 2, 11, 38-41 properly rejected under 35 U.S.C. §102(b) as being anticipated by Shimizu (US Patent 6,018,692)?

2. Are Claims 8-10, 29-32, 34, 35, 38-43, 53-58 properly rejected under 35 U.S.C. §103(a) as being unpatentable over Shimizu in view of Hidaka (US Publication 2002/0005302)?

3. Are Claims 28, 36, 44, 46, 47, 49-51, 59, 60 properly rejected under 35 U.S.C. §103(a) as being unpatentable over Shimizu in view of Hidaka and further in view of Watson (US Publication 2001/0042652)?

VII. Argument

Claims 1, 2, 11, 38-41 are not properly rejected under 35 U.S.C. §102(b) as being anticipated by Shimizu (US Patent 6,018,692)

Claim 1

Claim 1 is directed to a method for controlling the vehicle having a turning radius that includes the steps of determining a steering wheel angle, determining a steering wheel direction, determining a steering wheel angular rate, and applying brake-steer as a function of steering wheel angle, steering wheel angular rate, and steering wheel direction.

For a proper §102 rejection, each and every element of the claim must be present in the reference. Appellants admit that a steering wheel angle detecting means S1 is set forth in *Shimizu*. However, what is not set forth is determining steering wheel direction. The Examiner points to torque detector S2. However, Appellants can find no teaching or suggestion that the torque is used to determine the steering direction. It should be noted that those skilled in the art will recognize the various sensors are absolute and thus they may not necessarily determine the direction of the torque. This is emphasized in *Shimizu* at column 3, lines 30-40, which specifically set forth that a button is pushed to determine which direction to turn the vehicle. Thus the torque detector is not used to determine a steering wheel direction. Moreover, the

Examiner fails to point out the step of "determining a steering wheel angular rate." Determining a steering wheel angular rate is not taught or suggested in the *Shimizu* reference. The Examiner fails to allege this. Likewise, Claim 1 recites applying brake-steer as a function of the steering wheel angle, steering wheel direction, and steering wheel angular rate.

Appellants respectfully submit that applying brake-steer is not taught or suggested in *Shimizu*. Applying brakes is taught, but applying brakes to help the vehicle steer (i.e., brake-steer) is not taught or suggested. Braking in *Shimizu* is only applied to stop the vehicle during automatic parking. The braking does not help the vehicle steer. Rather, at column 4, lines 1-13, *Shimizu* teaches steering assist using a power steering unit. Appellants therefore respectfully submit that each and every element of Claim 1 is not taught or suggested in the *Shimizu* reference and therefore Appellants respectfully submit that Claim 1 should be passed to issue over the Examiner's rejection.

Claims 2 and 11

Claims 2 and 11 are dependent upon Claim 1 and are also believed to be allowable for the reasons set forth above.

Claim 38

Claim 38 recites determining a driver selectable mode, generating a steering enhanced signal in response to the driver selectable mode, and actuating at least one brake on one side of the vehicle in response to said steering enhanced signal to enhance the turning radius achieved by the steering mechanism. As mentioned above, Shimizu at Col. 3, lines 30-40, describes a driver selectable parking mode. However, no teaching or suggestion is provided to enhance the turning radius by the steering mechanism by applying at least one brake on one side of the vehicle. As mentioned above, the braking is applied to all the wheels of the vehicle to stop the vehicle rather than to assist the vehicle in steering. Therefore, Claim 38 is also not taught in the *Shimizu* reference.

Claims 39-41

Claims 39-41 are dependent upon Claim 38 and are also believed to be allowable.

Claims 8-10, 29-32, 34, 35, 38-43, 53-58 are not properly rejected under 35 U.S.C. §103(a) as being unpatentable over Shimizu in view of Hidaka (US Publication 2002/0005302)

Claims 8-10

As mentioned above, the *Shimizu* reference is missing several limitations of Claim 1. Claims 8-10 depend from Claim 1. The *Hidaka* reference does not teach or suggest the elements missing from *Shimizu.* Therefore, Claims 8-10 are also allowable over the Examiner's rejection.

Claim 29

Claim 29 is an independent claim that specifically recites in a parking mode applying a first positive torque to a first driven wheel and simultaneously with the step of applying a first positive torque, applying a second positive torque greater than the first positive torque to a second wheel, so that the turning radius of the vehicle is reduced. Although applying a torque to prevent the vehicle from rolling downhill is described in the *Shimizu* reference, no teaching or suggestion is provided for applying a first positive torque and a second positive torque greater than the first positive torque on separate wheels, so that the turning radius of the vehicle is reduced. Likewise, the *Hidaka* reference also does not teach or suggest this element. Claim 29 is therefore allowable over the Examiner's rejection.

Claims 30-32, 34 and 35

Claims 30-32, 34 and 35 are dependent upon Claim 29 and are also believed to be allowable.

Claim 38

Claim 38 is an independent claim directed to a method for enhancing the turning ability of a vehicle. Determining a driver selectable mode is set forth along with generating a steering enhanced signal in response to the driver selectable mode and actuating at least one brake on one side of the vehicle in response to said steering enhanced signal to enhance the turning radius achieved by the steering mechanism. As described above, no teaching or suggestion is provided in *Shimizu* for a driver selectable mode generating a steering enhanced signal to enhance the turning radius achieved by the steering mechanism. At most, the *Shimizu* reference teaches using the vehicle capabilities to automatically move into a parking position

but does not enhance the steering capability of the vehicle. Claim 38 is therefore believed to be allowable.

Claims 39-43

Claims 39-43 are dependent upon Claim 38 and are also believed to be allowable.

Claim 53

Claim 53 recites an apparatus claim similar to that of Claim 29. Therefore, Claim 53 is also believed to be allowable for the same reasons set forth above with respect to Claim 29.

Claims 54-58

Claims 54-58 depend upon Claim 53 and are also believed to be allowable for the reasons set forth above.

Claims 28, 36, 44, 46, 47, 49-51, 59, 60 are not properly rejected under 35 U.S.C. §103(a) as being unpatentable over Shimizu in view of Hidaka and in further view of Watson (US Publication 2001/0042652)

Claims 28, 36, 44, 46, 47, 49-51, 59, 60

Although the *Watson* reference teaches an on demand vehicle drive system, no teaching or suggestion is provided for providing brake-steer or enhancing the steering capability of the vehicle. The deficiencies of the *Shimizu* and *Hidaka* references have been recited above, and will not be repeated here. The *Watson* reference does not teach or suggest the missing elements. Appellants therefore respectfully request that the Examiner be directed to pass Claims 28, 36, 44, 46, 47, 49-51, 59, and 60 to issue.

VIII. Claims Appendix

A copy of each of the claims involved in this appeal, namely Claims 1-32, 34-36, 38-44, 46, 47, 49-51, and 53-60 is attached as a Claims Appendix.

IX. Evidence Appendix

None.

X. Related Proceedings Appendix

None.

XI. *Conclusion*

For the foregoing reasons, Appellants respectfully request that the Board direct the Examiner in charge of this examination to withdraw the rejections.

Please charge any fees required in the filing of this appeal to deposit account 06-1510.

Respectfully submitted,

Jérome R. Drouillard, Reg. No. 28008
28333 Telegraph Road, Suite 250
Southfield, MI 48034
(248) 223-9500
(248) 223-9522

Date: 8/9/04

CLAIMS APPENDIX

1. A method of controlling an automotive vehicle having a turning radius comprising:

determining a steering wheel angle;

determining a steering wheel direction;

determining a steering wheel angular rate and

applying brake-steer as a function of steering wheel angle, steering wheel angular rate and steering wheel direction.

2. A method as recited in claim 1 further comprising determining a vehicle *speed and wherein applying brake-steer comprises applying brake-steer as a function of* steering wheel angle, steering wheel rate, steering wheel direction and said vehicle speed.

3. A method as recited in claim 1 wherein the steering wheel direction comprises an increasing direction and a decreasing direction wherein applying brake-steer comprises applying brake-steer using a first boost curve in a first direction and applying brake-steer using a second boost curve in a second direction wherein the first boost curve is different than the second boost curve.

4. A method as recited in claim 3 wherein the first boost curve comprises a non-linear-boost curve.

5. A method as recited in claim 3 wherein the first boost curve increases brake-steer at a first rate for a first period of time, increases brake-steer at a second rate for a second period of time, wherein the second rate is greater than the first rate, and increases brake-steer at third rate for a third period of time, wherein the third rate is less than the second rate.

6. A method as recited in claim 3 wherein the second boost curve comprises a non-linear-boost curve.

7. A method as recited in claim 3 wherein the second boost curve decreases brake-steer at a first rate for a first period of time and decreases brake-steer at a second rate for a second period of time, wherein the second rate is less than the first rate.

8. A method as recited in claim 1 wherein applying brake-steer reduces the turning radius of the vehicle.

9. A method as recited in claim 8 wherein applying brake-steer comprises applying at least one brake at a first wheel to reduce the vehicle turning radius.

10. A method as recited in claim 9 wherein applying brake-steer comprises applying an increased drive torque to a second wheel.

11. A method as recited in claim 1 further comprising detecting a parking mode, and applying brake-steer as a function of the parking mode, steering wheel angle, steering wheel angular rate and steering wheel direction.

12. A method of controlling an automotive vehicle comprising:

detecting a parking mode;

in the parking mode, when the steering wheel angle is increasing applying brake-steer using a first boost curve; and

when the steering wheel angle is decreasing applying brake-steer using a second boost curve different than the first boost curve.

13. A method as recited in claim 12 wherein applying brake-steer comprise a function of a steering wheel angle, a steering wheel angular rate and a steering wheel direction.

14. A method as recited in claim 12 further comprising determining a vehicle speed and wherein applying a brake-steer comprises applying brake-steer as a function of a steering wheel angle, a steering wheel rate, a steering wheel direction and a vehicle speed.

15. A method as recited in claim 12 wherein the first boost curve comprises a non-linear-boost curve.

16. A method as recited in claim 12 wherein the first boost curve increases brake-steer at a first rate for a first period of time, increases brake-steer at a second rate for a second period of time, wherein the second rate is greater than the first rate and increases brake-steer at third rate for a third period of time wherein the third rate is less than the second rate.

17. A method as recited in claim 12 wherein the second boost curve comprises a non-linear-boost curve.

18. A method as recited in claim 12 wherein the second boost curve decreases brake-steer at a first rate for a first period of time and decreases brake-steer at a second rate for a second period of time, wherein the second rate is less than the first rate.

19. A method as recited in claim 12 wherein applying brake-steer comprises applying at least one brake at a first wheel to reduce a vehicle turning radius of the vehicle; and

simultaneously with the step of applying at least one brake, applying drive torque to a second wheel.

20. A method as recited in claim 12 wherein detecting a parking mode comprises detecting a parking mode in response to a vehicle speed.

21. A method as recited in claim 12 wherein detecting a parking mode comprises detecting a parking mode in response to a steering wheel angle.

22. A method as recited in claim 12 wherein detecting a parking mode comprises detecting a parking mode in response to a vehicle speed and a steering angle.

23. A method as recited in claim 12 wherein detecting a parking mode comprises detecting a parking mode in response to a driver-actuated switch.

24. A method as recited in claim 12 further comprising determining a surface mu, wherein applying brake-steer comprises applying brake-steer in response to the surface mu to reduce a vehicle turning radius.

25. A method as recited in claim 12 further comprising determining a vehicle load, wherein applying brake-steer comprises applying brake-steer at a first wheel in response to the vehicle load to reduce a vehicle turning radius.

26. A method as recited in claim 12 further comprising determining a throttle position, wherein applying brake-steer comprises applying brake-steer in response to the throttle position to reduce a vehicle turning radius.

27. A method as recited in claim 12 wherein applying brake-steer comprises applying at brake-steer as a function of an anti-lock brake system.

28. A method as recited in claim 12 wherein applying brake-steer comprises applying brake-steer as a function of a traction control system.

29. A method of controlling an automotive vehicle having a turning radius comprising:

detecting a parking mode;

in the parking mode, applying a first positive torque to a first driven wheel; and

simultaneously with the step of applying a first positive torque, applying a second positive torque greater than the first positive torque to a second wheel so that the turning radius of the vehicle is reduced.

30. A method as recited in claim 29 further comprising determining a brake pressure request, and discontinuing the steps of applying a first positive torque and a second positive torque when said request is greater than a predetermined threshold.

31. A method as recited in claim 29 wherein detecting a parking mode comprises detecting a parking mode in response to a vehicle speed.

32. A method as recited in claim 29 wherein detecting a parking mode comprises detecting a parking mode in response to a steering wheel angle.

34. A method as recited in claim 29 wherein detecting a parking mode comprises activation of a switch mechanism.

35. A method as recited in claim 29 wherein applying a second positive torque comprises applying the second positive torque as a function of a traction control system.

36. A method as recited in claim 29 further comprising switching from a 4x4 mode into a 4x2 mode when applying the second positive torque.

38. A method of enhancing the turning ability of a vehicle having a steering mechanism comprising:

determining a driver selectable mode;

generating a steering enhance signal in response to the driver selectable mode; and

actuating at least one brake on one side of the vehicle in response to said steering enhance signal to enhance the turning radius achieved by the steering mechanism.

39. A method as recited in claim 38 wherein determining a driver selectable mode comprises determining a driver selectable mode in response to a switch mechanism.

40. A method as recited in claim 38 wherein actuating comprises actuating a first brake.

41. A method as recited in claim 38 wherein actuating comprises actuating a first brake and a second brake.

42. A method as recited in claim 38 wherein actuating comprises actuating a first brake at a first wheel and further comprising applying a positive engine torque at a second wheel.

43. A method as recited in claim 38 wherein activating a least one brake comprises activating at least one brake in response to an anti-lock brake system.

44. A method of controlling an automotive vehicle having a turning radius comprising:

detecting a parking mode;

detecting a transfer case mode;

applying brake-steer in response to a parking mode and a transfer case mode.

46. A method as recited in claim 44 wherein detecting a parking mode comprises detecting a parking mode in response to a vehicle speed.

47. A method as recited in claim 44 wherein detecting a parking mode comprises detecting a parking mode in response to a steering wheel angle.

49. A method as recited in claim 44 wherein detecting a parking mode comprises detecting a parking mode in response to a driver-actuated switch.

50. A method as recited in claim 44 wherein applying brake-steer comprises applying an increased drive torque to a second wheel relative to a first wheel.

51. A method as recited in claim 44 wherein applying brake-steer comprises applying brake-steer to a front wheel.

53. A vehicle comprising:

means to determine a parking mode; and

a controller coupled to the means to determine a parking mode, said controller programmed to, in the parking mode, apply a first positive torque to a first driven wheel and simultaneously with applying the first positive torque, apply a second positive torque greater than the first positive torque to a second wheel so that the turning radius of the vehicle is reduced.

54. A vehicle as recited in claim 53 further comprising a traction control system, wherein the first positive torque is a function of the traction control system.

55. A vehicle as recited in claim 53 wherein the means to determine a parking mode comprises detecting a parking mode in response to a vehicle speed.

56. A vehicle as recited in claim 53 the means to determine a parking mode comprises detecting a parking mode in response to a steering wheel angle.

57. A vehicle as recited in claim 53 wherein the means to determine a parking mode comprises detecting a parking mode in response to a vehicle speed and a steering angle.

58. A vehicle as recited in claim 53 wherein the means to determine a parking mode comprises detecting a parking mode in response to a driver-actuated switch.

59. A vehicle as recited in claim 53 further comprising a transfer case having a 4x2 mode and a 4x4 mode, said controller selecting 4x2 mode when applying a second positive torque.

60. A method as recited in claim 53 wherein the vehicle comprises an open differential or a limited slip differential.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.